

6. ENVIRONMENTAL INFORMATION – PROPOSED PROJECT

Minn. Rules 4400.1150, subps. 2E, 2F, and 3 require environmental information for the Project that is intended to meet the needs of the Badoura area load center. This portion of the Application provides a description of the land use and environmental setting associated with the Project, potential impacts, and mitigative measures.

The Project has been reviewed by a number of state and federal agencies. All environmental review correspondence related to the Proposed Route is provided in Appendix C.

6.1 Description of Environmental Setting

MP and GRE propose to construct approximately 63 miles of overhead 115 kV transmission line and associated substation upgrades (the Project) to meet the growing electrical load of the Badoura project area. The Proposed Route is located between the endpoints of Pequot Lakes, Pine River, Badoura, Hackensack and Park Rapids and traverses through Cass, Crow Wing and Hubbard counties (Figure 6-1).

The Proposed Route is located within the Northern Minnesota Drift and Lake Plains section of the Ecological Classification System (Minnesota Department of Natural Resources (MDNR), 2005: *Ecological Classification System*), within the Pine Moraines and Outwash Plains subsection. This subsection is characterized by end moraines, outwash plains, till plains and drumlin fields (MDNR, 2005: *Ecological Classification System*). Sands and sandy loam soils overlay bedrock and vary in depth between 200 and 600 feet below ground surface.

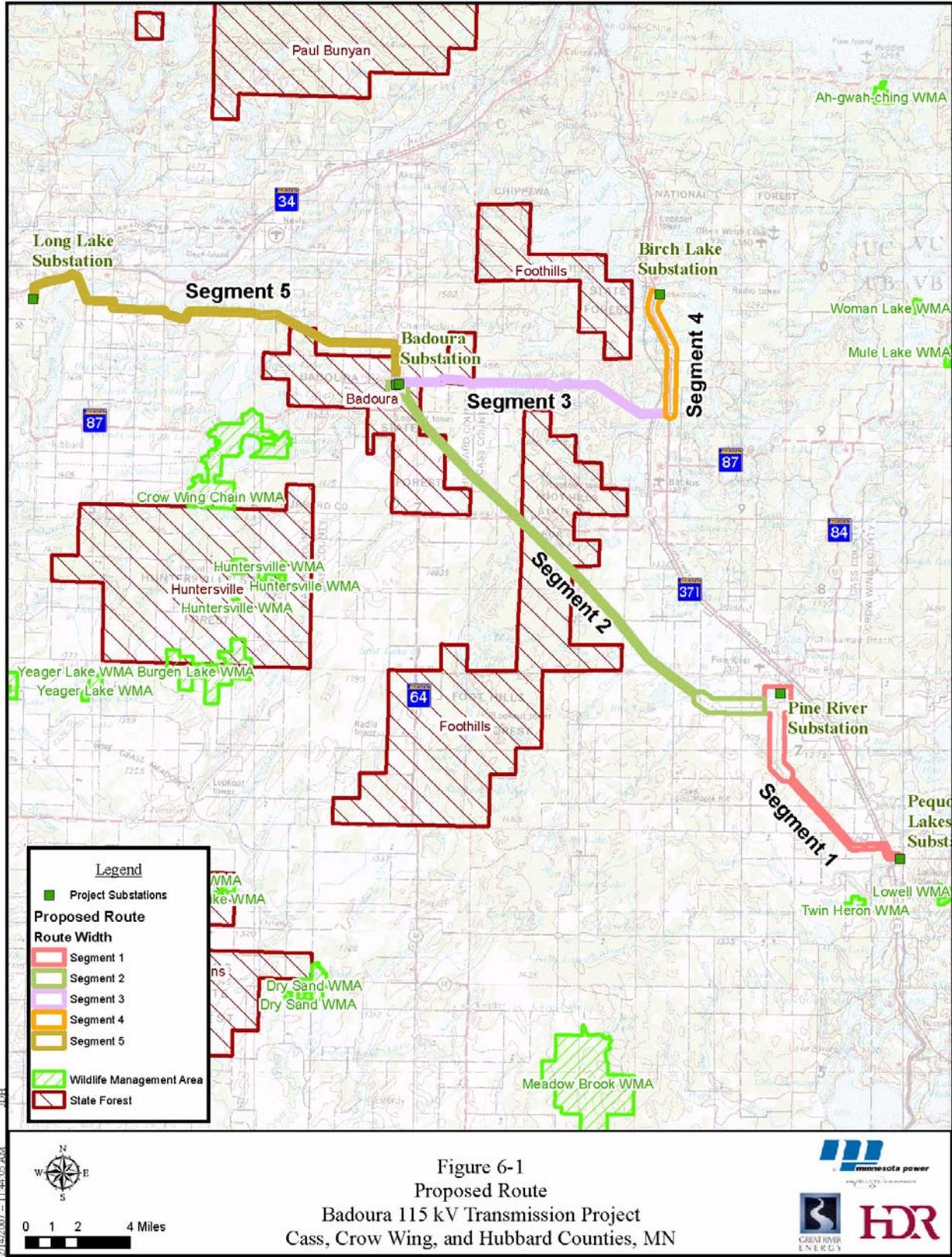
Presettlement vegetation consisted primarily of mature conifer and northern hardwood forests, interspersed with lake and wetland plant communities. Present day vegetation along the Proposed Route is made up of deciduous, mixed and coniferous forests and grassland, with interspersed agricultural land, lakes and wetlands.

The largest towns in the vicinity of the Proposed Route are Pine River and Park Rapids. Other communities near the Proposed Route are primarily small towns. The Proposed Route crosses two state forests, and a few Wildlife Management Areas (WMA) are located within five miles of the Proposed Route (MDNR, 2004).

6.2 Effects on Human Settlement

6.2.1 Public Health and Safety

Proper safeguards would be implemented for construction and operation of the facility. The Project would be designed with local, state, Rural Utilities Service (RUS) and National Electric Safety Code (NESC) standards regarding clearance to ground, clearance to crossing utilities, clearance to buildings, strength of materials and right-of-way widths. Construction crews and/or contract crews would comply with local, state,



RUS and NESC standards regarding installation of facilities and standard construction practices. Established Applicants' and industry safety procedures would be followed during and after installation of the transmission line, including clear signage during all construction activities.

The proposed transmission line would be equipped with protective devices to safeguard the public if an accident occurs and a structure or conductor falls to the ground. The protective devices are breakers and relays located where the transmission line connects to the substation. The protective equipment would de-energize the transmission line should such an event occur. In addition, the substation facilities would be fenced and access limited to authorized personnel.

There are three publicly accessible airports in the vicinity of the Project: the Pine River Regional Airport, the Backus Municipal Airport, and the Park Rapids Municipal Airport. See Section 6.10 for a discussion of potential airport conflicts.

6.2.2 Displacement

The siting of the transmission line and new poles will be done in a manner such that no person will be displaced from their residence or business.

6.2.3 Noise

There will be two sources of audible noise from the project; the transmission line conductors and transformer additions at the Pine River, Birch Lake and Long Lake substations. Although changes to the equipment will be made at the other substations, existing noise levels at those substations will not increase.

Noise Measurement

Noise levels are measured on a logarithmic scale in units of decibels. Because human hearing is not equally sensitive to all frequencies of sound, it is customary to apply a weighting factor so the overall measured sound pressure level will relate as closely as possible to the ear's perception of the sound. The A-weighting network is typically used and the measured sound level is expressed in units of decibels A-weighted (dB(A)). In general terms, a noise level change of 3 dB(A) is imperceptible to human hearing. A 5 dB(A) change in noise level is clearly noticeable and a 10 dB(A) change in noise level is perceived as a doubling of noise loudness. Table 6-1 provides estimates of the noise levels of some common noise sources expressed in dB(A).

Table 6-1 Common Noise Levels

Sound Level db(A)	Noise Source
140	Jet Engine (at 25 meters)
130	Jet Aircraft (at 100 meters)
120	Rock and Roll Concert
110	Pneumatic Chipper
100	Jointer/Planer
90	Chainsaw
80	Heavy Truck Traffic
70	Business Office
60	Conversational Speech
50	Library
40	Bedroom
30	Secluded Woods
20	Whisper

Source: A Guide to Noise Control in Minnesota, MPCA, 1999

Noise Regulations

The Noise Control Requirement in Minnesota Pollution Control Agency (MPCA) Minn. Rules 7030.0030 (MPCA, Undated) states that noise contributors shall comply with the Noise Area Classifications (NAC) Rule 7030.0040 criteria shown in Table 6-2. The noise area classification is based on land use activity at the location of the receiver. For example, household units are defined under NAC (1), bus passenger terminals are defined under NAC (2), and transportation rights-of-way are defined under NAC (3). NAC (1) includes the most noise-sensitive areas such as households, hospitals, churches, and campgrounds.

Table 6-2 Minn. Rules 7030.0040 Noise Area Classifications

NAC	Day (0700-2200)		Night (2200-0700)	
	L ₅₀	L ₁₀	L ₅₀	L ₁₀
1	60	65	50	55
2	65	70	65	70
3	75	80	75	80

The Minnesota noise rules use the A-weighting network and apply statistical sound levels (L Level Descriptors) to account for changes in sound levels over a period of time (see Table 6-2). The L₁₀ is defined as the noise level exceeded 10 percent of the time, for example six minutes in an hour. The L₅₀ is the noise level exceeded 50 percent of the time, such as 30 minutes in an hour. The industry standard for utilities is calculated based on L₅₀ and L₅ for audible noise emissions. The L₅ is the noise level exceeded five percent of the time, or for three minutes in an hour.

Conductor Noise

Audible noise from conductors is due to point source corona formation (minor breakdown of air insulating a conductor), and is a function of conductor radius, surface

condition, line geometry, weather conditions, and operating voltage. Noise from a transmission line reaches its maximum during heavy rain. However, during heavy rain the general background noise level is usually greater than the noise from the transmission line. As a result, people do not normally notice audible noise from a transmission line during heavy rain. During light rain, dense fog, snow, and other times when there is moisture in the air, transmission lines will produce an audible crackling noise at approximately household background levels due to the small amount of electricity ionizing the moist air near the wires. During dry weather, audible noise from transmission lines is barely perceptible.

The proposed 115 kV line is expected to be essentially inaudible at the edge of the right-of-way during fair weather conditions. Anticipated levels for L₅ wet conductor condition for the proposed 115 kV line, based on the results from the Electric Power Research Institute’s EMWORKSTATION: ENVIRO Software Version 3.0, are shown in Figures 6-2 and 6-3. Under the worst-case scenario, the L₅ noise level may approach a maximum of 48 dB(A) at the edge of the 91 Line right-of-way, which is below the most restrictive Minnesota noise control rules (see Table 6-2). For the right-of-ways without an existing 230 kV circuit, noise levels will be less than approximately 25 dB(A) directly under the conductors.

Figure 6-2 Audible Noise – Badoura Project Structures – Segments 1 and 2

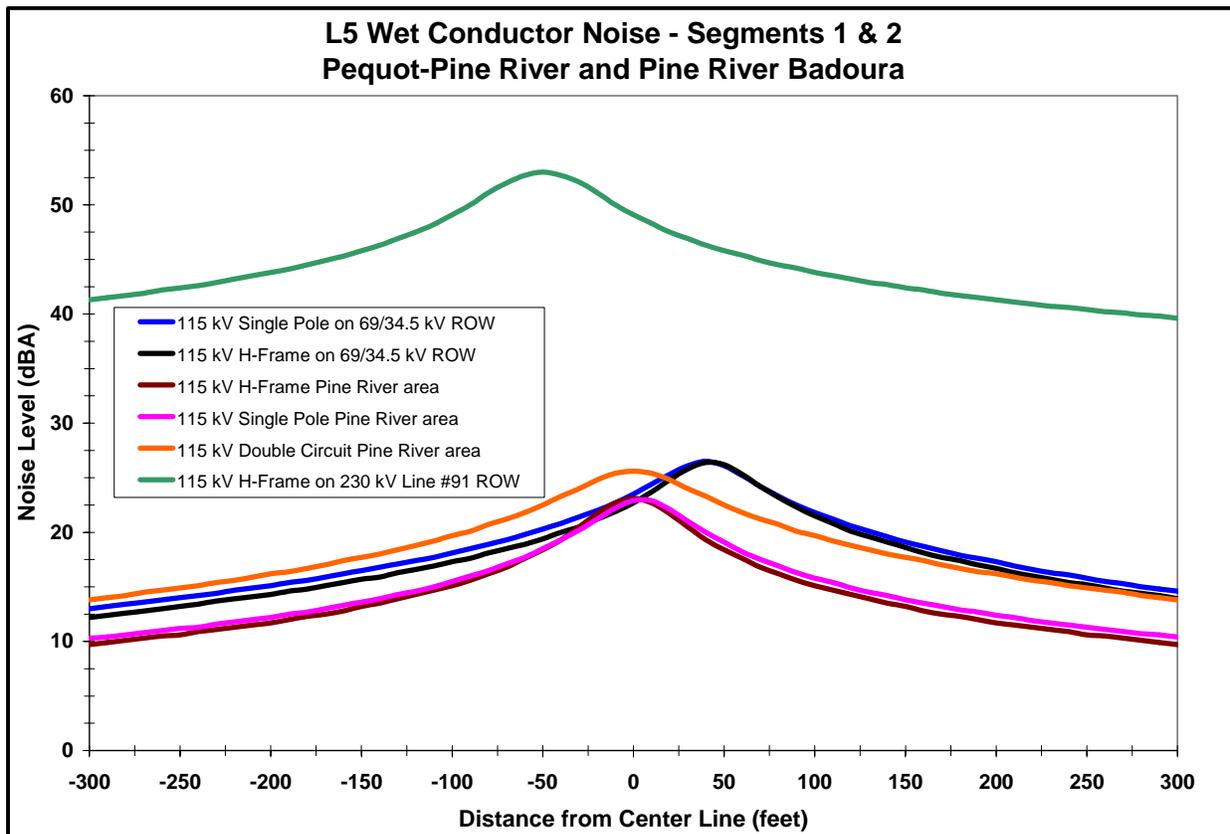
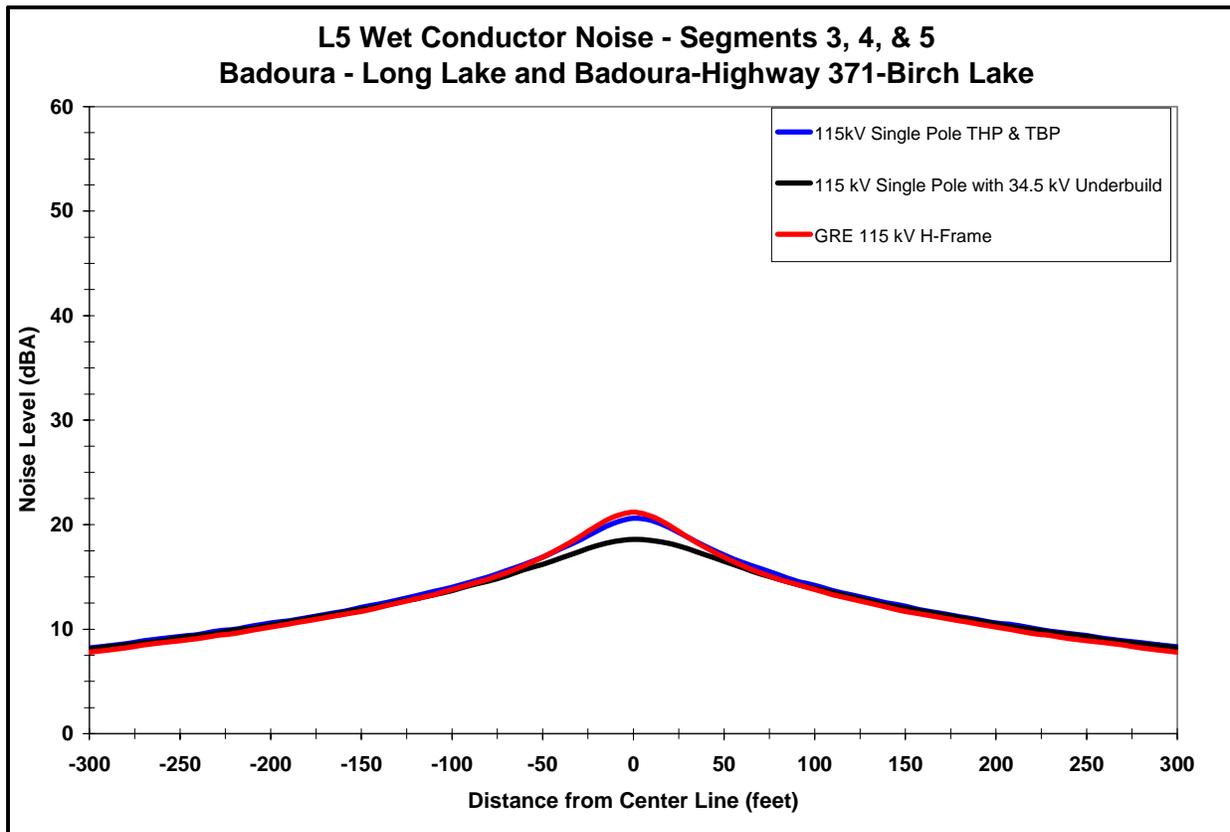


Figure 6-3 Audible Noise – Badoura Project Structures – Segments 3, 4 and 5



Perry (1972) has reported that numerous complaints can be expected if the alternating current (AC) transmission line audible noise exceeds approximately 59 dB(A) and that few complaints should be expected if audible noise is below 52.5 dB(A). The calculated values at the edge of the right-of-way for the Project are below these thresholds and audible noise will be barely perceptible during fair weather. In addition, the Applicants are unaware of any complaints related to audible noise, radio or TV interference resulting from the operation of existing 115 kV transmission lines located near the project area (Pequot Lakes, Badoura, Akeley and Park Rapids for example), and do not expect that audible noise or radio TV interference will be an issue along the Proposed Route.

Substation Noise

The main source of audible noise in a substation is the transformers. Transformers will produce noise whenever they are energized and the level of noise, or its loudness, depends on transformer size, operating condition (cooling fans on or off, etc.), voltage level, and weather conditions. Generally, noise levels during operation and maintenance of substations are minimal.

Pine River Substation

Expansion at existing site - At the existing Pine River Substation, the existing transformers will be removed and a 115/34.5, 33 MVA transformer as well as a 115/12.5 kV, 10.5 MVA transformer will be added as part of the Project. The substation will be designed to accommodate the addition of a second 115/34.5 kV and 115/12.5 kV transformer.

Noise calculations were completed to determine separation distance necessary to meet the 50 dB(A) limit imposed by the Minnesota NAC for Area 1. This analysis was based on purchase of the transformer with noise levels no greater than 90% of the National Electrical Manufacturers Association (NEMA) standard for a 33 MVA 550 BIL 115/34.5 kV and 10.5 MVA 550 BIL 115/12.5 kV two winding transformers and assumed that a second set of transformers would be added in the future. Based on these assumptions, noise levels would be at or below 50 dB(A) at a distance of approximately 200 feet from the transformers (the closest home is 500 feet from the substation). The land to be purchased for the substation will be large enough to ensure the Project will comply with Minnesota NAC Area 1 requirements.

Construction at new site - If the substation is constructed at a site other than the existing site, noise levels would be at or below 50 dB(A) at a distance of slightly less than 200 feet from the transformers because there would be no 115/12.5 kV transformers at this site. The closest home to this site would be over 300 feet away. The land to be purchased for the substation will be large enough to ensure the Project will comply with Minnesota NAC Area 1 requirements.

If the 115/34.5 kV substation is constructed at another site, the existing 34.5/12.5 kV transformer at the existing Pine River Distribution Substation would be replaced with a 115/12.5 kV 10.5 MVA transformer. Noise calculations indicate that noise from the operation of the 115/12.5 kV transformer will be below the 50 dB(A) beyond approximately 75 feet from the substation (assumes two new transformers with noise level of no more than 90% of NEMA standard for two winding transformers). The results of this analysis show that there would be no adverse impacts associated with noise from the operation of the substation after the Project or if a second transformer was added in the future.

Badoura Substation

No new transformers are planned as part of the Project at the Badoura Substation; therefore noise produced from the operation of the Badoura Substation will not change.

Long Lake Substation

A second 115/34.5 kV 50 MVA transformer will be added at the Long Lake Substation. This will increase the noise level produced by the substation by approximately 3 dB(A). An increase of 3 dB(A) is at the threshold of the ability for humans to perceive a change in loudness. The planned additions at the Long Lake Substation will therefore not result in any significant impact to nearby residents.

Birch Lake Substation

A new 115/69 kV 60 MVA auto-transformer will be added at the Birch Lake Substation. Presently there is a 69/34.5 kV 20 MVA two winding transformer at this substation. The planned addition of second larger transformer will result in an increase in overall noise levels of approximately 4 dB(A) based on the NEMA standard audible noise level table (assumes the new 60 MVA auto-transformer will have a noise level no greater than 90% of the NEMA Standard for a 550 BIL two winding equivalent and the existing 69/34.5 kV 20 MVA two winding transformer having a noise level based on the 350 BIL NEMA Standard). Although this will result in a noticeable increase in audible noise, the noise levels will remain below the Minnesota NAC Area 1 standards at locations beyond approximately 225 feet from the transformers. The closest home is located over 300 feet from the substation, therefore no significant adverse impacts will be associated with the increase in audible noise from the substation.

6.2.4 Aesthetics

In general, aesthetic impacts are dependent on the response of the viewer. Viewer response is based on the sensitivity and exposure of the viewer to a particular viewshed. Sensitivity relates to the magnitude of the viewer's concern for the viewshed, while exposure is a function of the type, distance, perspective and duration of the view. Sensitivity can be described in terms of "levels of sensitivity." Three levels of sensitivity can be used to identify potential impact areas:

- ◆ Low Visual Sensitivity – motorists viewing transmission lines from the perspective of the roads they traverse.
- ◆ Moderate Visual Sensitivity – recreationalists, such as bird watchers, hikers, hunters and other individuals whose activity is specific to and who are sensitive to a finite geographic location, and who are sensitive to man-made structures and their impact on the natural environment.
- ◆ High Visual Sensitivity – residential viewers who own property within 500 feet of the Proposed Route alignment and are concerned about the structures and how they impact the view of the natural environment.

The Proposed Route crosses the Badoura State Forest, the Foothills State Forest, and parallels TH 34, which is a state-designated Lake Country Scenic Byway. These areas would be considered moderate to high visual sensitivity resources. Homes within 500 feet of the Proposed Route alignment will be the most likely to have their viewshed affected by the construction of a transmission line, and are therefore considered potentially high visual sensitivity resources.

6.2.5 Socioeconomics

The socioeconomic setting and potential impacts of the Proposed Route were evaluated on a regional basis, comparing data for Cass, Crow Wing and Hubbard counties with average data for the State of Minnesota.

Cass County

The Proposed Route crosses Cass County in Loon Lake, Wilson, Walden, Bull Moose, Pine River, Deerfield, Powers and Birch Lake townships. According to the U.S. Census, the county had a year 2000 population of 27,150, and an estimated 2005 population of 28,910 (U.S. Census Bureau, 2006: State and County Quick Facts, Cass County). The 2002 Cass County Comprehensive Plan shows that between 1990 and 2000, the population grew by 25 percent and is continuing to grow (Cass County, 2002).

General demographics for Cass County show a 50.5 percent male and 49.5 percent female distribution of the predominantly (86.5 percent) white population, slightly lower than the State of Minnesota's white population (89.6 percent). Approximately 18 percent of residents are 65 years old or older. Median household income for the county (\$34,332) is approximately 27 percent lower than the statewide average of \$47,111 (U.S. Census Bureau, 2000). Unemployment in Cass County was 8.2 percent, higher than the statewide average (4.7 percent) for the year 2004 (United States Department of Agriculture (USDA) Economic Research Service, 2005).

The county's 646 farms (197,153 acres) produced agricultural products with a total market value of over \$14.3 million in the year 2002, including \$3.9 million in crops and \$10.4 million in livestock, poultry and related products (USDA, 2002 and 2004). Major employers in the county include government services, leisure and hospitality services and trade, transportation and public utilities (Minnesota Department of Trade and Economic Development, 2006).

Crow Wing County

The Proposed Route is located in northwest Crow Wing County in Sibley Township. According to the U.S. Census, the county had a year 2000 population of 55,099, and an estimated 2005 population of 59,917 (U.S. Census Bureau, 2006: State and County Quick Facts, Crow Wing County). The 2004 Crow Wing County Comprehensive Plan shows that between 1990 and 2000, the population grew by 25 percent, and is continuing to grow at a similar pace. Within the project area, the TH 371 corridor is showing the greatest amount of growth (Crow Wing County, 2004).

General demographics for Crow Wing County show a 49.2 percent male and 50.8 percent female distribution of the predominantly (97.6 percent) white population, higher than the State of Minnesota's white population (89.6 percent). Approximately 17.1 percent of residents are 65 years old or older. Median household income for the county (\$37,589) is approximately 20 percent lower than the statewide average of \$47,111 (U.S. Census Bureau, 2000). Unemployment in Crow Wing County was 5.5 percent, slightly higher than the statewide average (4.7 percent) for the year 2004 (USDA Economic Research Service, 2005).

The county's 755 farms (144,743 acres) produced agricultural products with a total market value of over \$13.7 million in the year 2002, including \$5 million in crops and \$8.7 million in livestock, poultry and related products (USDA, 2002 and 2004). The 2004 Comprehensive Plan shows that major employers in the county include retail centers, resorts, medical centers, government services and schools. Construction, real estate, finance, insurance, transportation and public utilities showed the largest growth from 1990 to 2000.

Hubbard County

The Proposed Route is within southeastern Hubbard County, in Badoura, White Oak, Nevis and Henrietta townships. According to the U.S. Census, the county had a 2000 population of 18,376, and an estimated 2005 population of 18,861 (U.S. Census Bureau, 2006: State and County Quick Facts, Hubbard County). The 1990 U.S. Census Data shows that between 1990 and 2000, the population grew by 23 percent, and is continuing to grow, although at a slower pace (U.S. Census Bureau, 2000).

General demographics for Hubbard County show a 50.0 percent male and 50.0 percent female distribution of the predominantly (96.3 percent) white population, higher than the State of Minnesota's white population (89.6 percent). Approximately 18 percent of residents are 65 years old or older. Median household income for the county (\$35,321) is approximately 25 percent lower than the statewide average of \$47,111 (U.S. Census Bureau, 2000). Unemployment in Hubbard County was 6.0 percent, slightly higher than the statewide average (4.7 percent) for the year 2004 (USDA Economic Research Service, 2005).

The county's 535 farms (140,004 acres) produced agricultural products with a total market value of over \$22.9 million in the year 2002, including \$17.3 million in crops and \$5.6 million in livestock, poultry and related products (USDA, 2002 and 2004). Major employers in the county include government services, trade, transportation and public utilities, manufacturing, education and health services, and leisure and hospitality services (Minnesota Department of Trade and Economic Development, 2006).

6.2.6 Cultural Values

Cultural values include those perceived community beliefs or attitudes in a given area that provide a framework for that community's unity. The communities in the vicinity of the Project (Hackensack, Park Rapids, Pine River, Pequot Lakes) appear to have

cultural values corresponding with the economic activities of agriculture, tourism, extraction and manufacturing. The major values within the region include individualism and appreciation of natural resources. Most of the Proposed Route runs through Cass County, where residents are predominantly of German, Norwegian, and American Indian heritage. The Project includes portions of three counties that have all been experiencing increasing population. Traditional attitudes and uses of local resources have been changing as the area plays a larger role in recreational tourism. For example, accommodation and food services now rank as the largest of 20 economic sectors in Cass County. The communities along the Proposed Route also value their heritage and pioneer roots as settlers of the rivers and lakes of the vicinity. Community and county historical societies have embraced heritage tourism as an industry. Local museums provide excellent opportunities for recreation related to interests in heritage.

Historically, the railroads that cross the region were important for gathering agricultural goods and transporting them to markets. Agriculture and farm-related business remain central to the regional economy. The area has a diversified economy that ranges from food processing operations to forest/timber product manufacturing to tourism. The residents along the Proposed Route likely value the natural environment and the opportunities natural resource-based industries bring to the region.

6.2.7 Public Services

The communities of Pequot Lakes, Pine River, Hackensack and Park Rapids provide typical public infrastructure to their residences (municipal water, waste management, etc.).

6.2.8 Unavoidable Impacts

Public Health and Safety

No impacts to public health and safety are anticipated as a result of this Project.

Aesthetics

The Proposed Route follows existing highways, county/township roads and transmission line corridors for the majority (91 percent) of its length. Most of the surrounding land use is forest or agricultural. Figure 6-4 shows photographs of how a typical road right-of-way transmission line installation will appear near Peysenske Lake east of Park Rapids. Figure 6-5 shows photographs of how the installation of H-Frame structures parallel to the existing MP 91 Line will appear in the cross-country sections of Segments 1 and 2. The Proposed Route will have limited impact on aesthetics in the project area because the existing transmission line is being upgraded or built parallel to existing transmission lines for the majority of the Proposed Route. An exception is the transmission line near the Pine River Substation in the vicinity of CSAH 1 and CR 171, where the Proposed Route will follow roadways or distribution lines (or possibly be located behind homes if that is the landowner preference and it is feasible from a construction standpoint). Figure 6-6 depicts the preferred structure type (single pole double circuit) for this portion of the Proposed Route.

Figure 6-4 Peysenske Lake Area - Existing and Proposed



Figure 6-5 MP 91 Line - Existing and Proposed



Figure 6-6 Proposed Transmission Line near Pine River Substation



There are three communities within one mile of the Proposed Route: Pequot Lakes, Pine River and Hackensack. Park Rapids is approximately a mile and a half from the western end of the Proposed Route; therefore, it will be difficult to view the transmission line from Park Rapids. The degree to which the structures are visible from Pequot Lakes, Pine River and Hackensack will vary depending on elevation and the proximity of the transmission line to each town.

The Project is not expected to impact viewers within the Badoura and Foothills State Forests because the Project will be built along existing rights-of-way through the forests, and the change to structures will be minimal. Review of field data and aerial photography indicates that approximately 168 homes are located within 500 feet of the Proposed Route alignment. However, due to the forested nature of the project area, many of these homes do not have a clear line of sight to the transmission line.

Socioeconomics

Construction of the proposed Project should result in short-term positive economic impacts in the form of increased spending for lodging, meals and other consumer goods and services. It is not anticipated that the Project will create new permanent jobs, but it will create temporary construction jobs that will provide a one-time influx of income to the area.

Expenditures made for equipment, energy, fuel, operating supplies and other products and services benefit businesses in the counties where the Project is located. Indirect impacts may occur through the increased capability of the electric system to supply energy to commercial and industrial users, which will contribute to the economic growth of the region.

Agricultural land will be temporarily removed from production during transmission line construction. Permanent agricultural land conversion associated with the transmission line structures is estimated at approximately 0.05 acres. If the Pine River Substation is relocated, the substation footprint would take less than 1.5 acres of agricultural land permanently out of production.

There will also be some long-term beneficial impacts from the new transmission lines. These benefits include an increase to the counties' tax base resulting from the incremental increase in revenue from utility property taxes. The availability of reliable power in the area will have a positive effect on local businesses and the quality of services provided to the general public.

Socioeconomic impacts resulting from the Project will be primarily positive with increased tax revenue and an influx of wages and expenditures made at local businesses during construction.

Public Services

No impacts to public services are expected as a result of the Project.

Cultural Values

The proposed transmission facilities would provide the region with a stable power supply for years to come. As the urban centers of north central Minnesota continue to grow and the diverse economic base continues to expand, the available power supplied by upgraded and additional facilities may encourage this development and afford the residents a stable economic environment in which to live and work. In addition, these opportunities presented by the diverse economy may continue to encourage civic pride; tourism may benefit from this unity as well.

6.2.9 Potential Mitigation

Public Health and Safety

The Applicants will ensure that safety requirements are met during the construction and operation of the facility. Additionally, when crossing roads or railroads during stringing operations, guard structures will be utilized to eliminate traffic delays and provide safeguards for the public.

Aesthetics

Although the transmission line will be a contrast to surrounding land uses, the Applicants will work with landowners to identify concerns related to the transmission line and aesthetics. In general, mitigation includes enhancing positive effects as well as minimizing or eliminating negative effects. Potential mitigation measures include:

- ◆ Location of structures, right-of-way and other disturbed areas will be determined by considering input from landowners or land management agencies to minimize visual impacts.
- ◆ Care will be used to preserve the natural landscape; construction and operation will be conducted to prevent any unnecessary destruction of the natural surroundings in the vicinity of the work.
- ◆ To the extent practicable, rivers and lakes will be crossed in the same location as existing transmission lines.
- ◆ To the extent practicable, existing transmission lines will be reconducted and/or double-circuited, to the extent that such actions do not violate sound engineering principles or system reliability criteria.
- ◆ To the extent practicable, new transmission lines will parallel existing transmission lines and other rights-of-way, to the extent that such actions do not violate sound engineering principles or system reliability criteria.
- ◆ Structures will be placed at the maximum feasible distance from highway and trail crossings, within limits of structure design.

Socioeconomics

Landowner compensation will be established by individual easements. In general, agricultural areas surrounding transmission line structures will still be accessible to farming. Project construction will not cause additional impacts to leading industries within the area. Mitigation measures will include:

- ◆ The movement of crews and equipment will be limited to the right-of-way to the greatest extent possible, including access to routes. The contractor will limit movement on the right-of-way to minimize damage to grazing land, crops or property and will avoid marring the land. If movement outside of the right-of-way is necessary during construction, permission will be obtained and any crop damage will be paid to the landowner.
- ◆ When weather and ground conditions permit, all deep ruts that are hazardous to farming operations and to movement of equipment will be repaired or compensation will be provided as an alternative if the landowner desires. Such ruts will be leveled, filled and graded or otherwise eliminated in an approved manner. In hay meadows, alfalfa fields, pastures and cultivated productive lands, compacted soils will be loosened and ruts will be leveled by scarifying, harrowing, discing or other approved methods. Damage to ditches, tile drains, terraces, roads and other features of the land will be corrected. The land and facilities will be restored as nearly as practicable to their original conditions.
- ◆ Right-of-way easements will be purchased through negotiations with each landowner affected by the Project and payment will be made of full value for crop damages or other property damage during construction or maintenance as negotiated.
- ◆ Construction will be scheduled during periods when agricultural activities will be minimally affected or the landowner will be compensated accordingly.
- ◆ Fences, gates and similar improvements that are removed or damaged will be promptly repaired or replaced.
- ◆ Landowners will be compensated for removal of mature yard trees, either through right-of-way negotiations or on a separate basis.

Public Services

Because no impacts are expected, no mitigation is necessary or proposed.

Cultural Values

Because no negative impacts are expected, no mitigation is necessary or proposed.

6.3 Effects on Land-Based Economies

6.3.1 Agriculture

Approximately 18 percent of the Proposed Route is presently in agricultural uses (MDNR, Gap Analysis Program (GAP) Land Cover Data, 2002).

According to the 2002 Census of Agriculture, the average farm size in Cass County decreased by five percent between 1997 and 2002. The number of full-time farms increased by 48 farms during that time period. Crop sales in 2002 for Cass County were \$3,949,000 (28 percent of agricultural products sold) and livestock sales were \$10,378,000 (72 percent). Crops in Cass County are primarily corn and forage and livestock is primarily cattle (USDA, 2002 and 2004).

The number of farms in Crow Wing County increased by 162 and the average farm size decreased by eight percent between 1997 and 2002. Crop sales in 2002 for Crow Wing County were \$5,005,000 (36 percent of agricultural products sold) and livestock sales were \$8,722,000 (64 percent). Crops in Crow Wing County are primarily corn and forage, and livestock is primarily cattle (USDA, 2002 and 2004).

The number of farms in Hubbard County increased by 104 and the average farm size decreased by nine percent between 1997 and 2002. Crop sales in 2002 for Hubbard County were \$17,309,000 (75 percent of agricultural products sold) and livestock sales were \$5,649,000 (25 percent). Crops in Hubbard County are primarily corn, dry beans (excluding lima and soybean) and forage, and livestock is primarily cattle (USDA, 2002 and 2004).

There are 10 central-pivot irrigation systems adjacent to the Proposed Route: five between the Badoura Substation and the Long Lake Substation, and five between the Badoura Substation and TH 371 (Farm Services Agency, 2003).

6.3.2 Forestry

Northern Minnesota contains economically important forestry industries. The Badoura State Forest has a MDNR-managed 200-acre state nursery, where Norway pine, jack pine, white pine, white spruce, black spruce, black walnut, green ash, red oak, silver maple and wild plum are cultivated (Lake Country Scenic Byway Organization, 2006). The nursery is located west of TH 64 at the intersection with TH 87 (MDNR, 2004: *State Forest Boundaries*). The Proposed Route also crosses Foothills State Forest, although no forestry production occurs within that state land.

6.3.2 Tourism

There are several large lakes in the project area (such as Long Lake, Pleasure Lake, Pine Mountain Lake, Peysenske Lake and Tenmile Lake) that are used for fishing and recreational boating (MDNR, 2006: *Lake Finder*), where it would be possible for

recreationalists to view the transmission line structures. There are resorts along the shores of some of the lakes that attract tourists throughout the year.

The project area also attracts thousands of hunters during deer season, as well as small game and waterfowl hunters. The Project does not cross any WMAs, but the state-owned parcels of the Badoura and Foothills State Forests that are crossed by the Proposed Route are open to hunting (MDNR, 2005: *Recreation Compass*).

The Badoura and Foothills State Forests also offer opportunities for wildlife viewing, camping, canoeing, horseback riding, boating, hiking and snowmobiling, cross country skiing, and off-road All Terrain Vehicle and motorcycle driving.

The Proposed Route crosses seven snowmobile trails: one between the Pequot Lakes Substation and the Pine River Substation, two between the Pine River Substation and the Badoura Substation, three between the Badoura Substation and the Birch Lake Substation, and one between the Badoura Substation and the Long Lake Substation (MDNR, 2004: *Minnesota State Trails*).

TH 34 is a state-designated scenic byway ("Lake Country Scenic Byway") through the project area. The scenic byway offers opportunities for birdwatching and wildlife viewing (Explore Minnesota, 2006).

The Paul Bunyan Trail, which runs along TH 371, and the Heartland Trail, which runs along TH 34, are tourist attractions for bicyclists (City of Brainerd, 2005).

A&J's Up North Buffalo Ranch, near Pequot Lakes, is an agri-tourism site that offers group tours of its operations and has a farm store on site (A&J Up North, 2006).

6.3.4 Mineable Resources

Notable mining resources in the area include the quaternary sands and gravels present in glacial outwash deposits. There are several active gravel and aggregate mining operations in the project area. In Crow Wing County, there is a gravel pit in the southwest quarter of Section 11 in Sibley Township, approximately one mile from the Pequot Lakes Substation (MNDOT, 2003: *General Highway Map: Crow Wing County*). In Cass County there are eight mining operations within a mile of the Proposed Route: one MNDOT aggregate pit in the northwest quarter of Section 17 in Wilson Township, approximately one mile from the Proposed Route; a MNDOT aggregate pit and a gravel pit in the southeast quarter of Section 31 in Deerfield Township, approximately 1,500 feet from the Proposed Route; two commercial aggregate pits and one MNDOT aggregate pit in Section 5 of Powers Township; one MNDOT aggregate pit in the northeast quarter of Section 8 of Powers Township; and one gravel pit in the northwest quarter of Section 32 in Birch Township (MNDOT, 2002). In Hubbard County, there is one gravel pit and one commercial aggregate pit adjacent to the Proposed Route in Section 14 of Henrietta Township (MNDOT, 2001).

6.3.5 Unavoidable Impacts

Agriculture

The Project will result in permanent and temporary impacts to farmland. Permanent impacts will occur as a result of structure placement along the Proposed Route of the transmission line. The Applicants estimate permanent impacts associated with structures to agricultural lands at approximately 0.05 acres. If the Pine River Substation is relocated, less than 1.5 acres of agricultural land could be permanently impacted. Approximately 84 percent of the permanent impacts to agricultural lands will occur on prime farmland soils, prime farmland when drained, or soils of statewide importance. During construction, temporary impacts, such as soil compaction and crop damages within the right-of-way, are likely to occur.

The Applicants estimate that approximately 146 acres of agricultural land will be impacted temporarily due to transmission line construction. The Applicants' preferred methodology for setting up staging areas and stringing setup areas is to use previously disturbed sites, such as abandoned parking lots; therefore the Applicants are not anticipating temporary impacts to agricultural lands from staging or setup areas. Land use impacts for the Proposed Route are described in more detail in Section 6.10.

Because the portions of the Proposed Route that are adjacent to central pivot irrigation systems follow existing transmission corridors, no impacts to central pivot irrigation are expected along the Proposed Route. The Applicants will work with landowners to minimize impacts to farming operations along the Proposed Route. Impacts can be minimized by aligning the transmission line along existing transmission and roadway corridors.

Forestry

The Proposed Route will not impact the Badoura Nursery. The Proposed Route will be built within existing right-of-way through the Badoura and Foothills State Forests. No privately-owned forest production industry will be affected by the Project.

Impacts along the Proposed Route to forested areas and shelterbelts are estimated at 133 acres.

Tourism

No impacts to area tourism are anticipated from the presence of the transmission line.

Mineable Resources

Based on a review of existing information, the Proposed Route will not impact active mining or quarrying operations. Poles will be placed to avoid affecting entrances and exits to any operations adjacent to the Proposed Route.

6.3.6 Potential Mitigation

Agriculture

The Applicants will compensate landowners for any crop damage or soil compaction that may occur during construction.

Forestry

Construction staging areas will be located and arranged in a manner to preserve trees and vegetation to the maximum practicable extent. As stated above, the preferred locations are previously disturbed sites such as abandoned parking lots. Unless otherwise agreed upon by the landowner, all storage and construction buildings, including concrete footings and slabs, and all construction materials and debris will be removed from the site once construction is complete. The area will be regraded as required so that all surfaces drain naturally, blend with the natural terrain, and are left in a condition that will facilitate natural revegetation and provide for proper drainage and prevent erosion.

Clearing for access will be limited to only those trees necessary to permit the passage of equipment, and will generally correspond to the transmission right-of-way corridors. If temporary access roads outside of the right-of-way corridors are necessary, they will be restored to native vegetation. Native shrubs that will not interfere with the safe operation of the transmission line will be allowed to reestablish in the right-of-way.

The Applicants will coordinate with the MDNR to determine the best avoidance and minimization measures to use in state-owned forested parcels along the Proposed Route.

Tourism

Because no impacts are expected, no mitigation is necessary or proposed.

Mineable Resources

Because no impacts are expected, no mitigation is necessary or proposed.

6.4 Cultural Resources

6.4.1 Archaeological and Historic Resources

The State Historic Preservation Office (SHPO) provided database search results of all known or reported archaeological sites and historic architectural structures in the sections that are within one-quarter mile of the Proposed Route. Within these sections, the database lists six archaeological sites and six historic architectural structures. Of these known resources, there are no archaeological sites or architectural structures listed on or currently considered eligible for listing in the National Register of Historic Places (NRHP). Most of the historic structures are within the corporate limits of the towns in the area, most notably Pine River and Pequot Lakes.

Because the SHPO database is organized by county, the database search results of nearby historic and archaeological sites are similarly presented below. Tables 6-3 and 6-4 show cultural resources within ¼ mile of the Proposed Route.

Table 6-3 Archaeological Resources within ¼ Mile of the Proposed Route

County	Site number	Description
Crow Wing	None	None
Cass	21CAbb	Cemetery
Cass	21CA0214	Trading post ruins
Hubbard	21HB0002	Lithic scatter
Hubbard	21HB0020	Earthwork, artifact scatter
Hubbard	21HB0058	Artifact scatter, structural ruins
Hubbard	21HBp	Artifact Scatter

Table 6-4 Architectural Resources within ¼ Mile of the Proposed Route

County	Site number	Description
Crow Wing	None	None
Cass	CA-HSC-001	School
Cass	CA-HSC-002	Church
Cass	CA-HSC-003	Village building
Cass	CA-PRC-052	Farmstead
Cass	CA-WLS-001	Bridge
Hubbard	HB-NVT-001	Camp Recreation

It is important to note that most of the sites shown on Tables 6-3 and 6-4 have not been evaluated as to their historical significance and that there may be other resources within the sections along the Proposed Route that have not yet been identified. However, the existence of the sites and resources listed here demonstrate that the region was attractive to and used by people throughout history. The archaeological sites listed range from the Archaic Period (6,000 - 800 years B.C.) to the Historic Period, with most falling within the Woodland Period (1000 B.C – 1700 A.D). In general, historic properties or structures must be at least 50 years old to be significant. In the area, these include civic buildings, bridges and farmsteads.

6.4.2 Unavoidable Impacts

Because the Proposed Route is in the right-of-way of existing lines and is adjacent to highways for the vast majority of its length, the likelihood that archaeological resources will be affected is relatively low because the corridor has already been disturbed by the previous construction of the roadway and the existing line. In areas not previously disturbed and where archaeological potential is assessed to be high, unrecorded

archaeological sites may be affected during construction of transmission structures, substations and substation expansions, maintenance structures, staging areas or access roads. Historic buildings or other sites may be impacted as well; in that construction of modern transmission structures may compromise the integrity of a historic viewshed from or to aboveground archaeological and historic resources. However, because there are lines already in place, a significant visual change is not anticipated.

6.4.3 Potential Mitigation

In a letter dated November 29, 2006 (Appendix C) and in previous correspondence related to the Certificate of Need Application, SHPO indicated that cultural resource surveys of the proposed project area would be needed. The Applicants will retain a cultural resources consultant to conduct a general survey of the Proposed Route (and more detailed surveys if required) in spring 2007.

The Applicants will make every effort to avoid impacts to identified archaeological and historic resources. In the event that an impact would occur, the Applicants will consult with SHPO and invited consulting parties (particularly Native American Tribes and other state and federal permitting or land management agencies) on whether or not the resource is currently listed on or eligible for listing in the NRHP. While avoidance of the resource would be a preferred action, mitigation for Project-related impacts on NRHP-eligible archaeological and historic resources may be required. In consultation with SHPO and other consulting parties, treatment plans will be developed that may include an effort to minimize Project impacts on the resource, and/or additional documentation through data recovery.

6.5 Air Quality

The only potential air emissions from a transmission line result from corona, which may produce ozone and oxides of nitrogen (see Section 7.4). This can occur when the electric field intensity exceeds the breakdown strength of the air. For a 115 kV transmission line, the conductor surface gradient is typically below the air breakdown level. As such, it is unlikely that any measurable emissions would occur from the conductor surface.

The 115 kV transmission line Project is therefore not expected to impact air quality.

6.6 Water Resources

Water resources along the Proposed Route are shown in the detailed route figures provided in Section 5 (Figures 5-2 to 5-17).

6.6.1 Groundwater

Groundwater resources in the study area include a buried Quaternary aquifer (comprised of glacial outwash deposits) and to a much lesser extent, Cretaceous and

Precambrian bedrock aquifers that are scattered throughout. In general, groundwater quantity and/or accessibility is not a problem in the study area. Groundwater resources may be encountered during excavations for transmission line structures in low-lying and/or wet areas. Depth to water table varies throughout the project area, from less than five feet to over 50 feet, but generally is found within 25 feet of the surface. In general, groundwater in the project area is relatively good, with chemical levels similar or lower than those found in similar aquifers elsewhere in Minnesota (MPCA, 1998).

6.6.2 Surface Water

The majority of the Proposed Route lies within the Pine River and Crow Wing River watersheds of the Upper Mississippi River Basin. A portion of the Proposed Route near Hackensack is in the Leech Lake River watershed of the Upper Mississippi River Basin. Within the portion of the corridor in Hubbard County and near Pequot Lake, surface water flows generally towards the Crow Wing River; within the middle portion of the project area the water generally flows towards the Pine River. At the northern terminus of the Proposed Route, surface water generally flows north, ultimately reaching Leech Lake (MPCA, 2005).

Riparian Areas

The Proposed Route crosses forested riparian areas associated with several creeks and streams, including Pine River, Crow Wing River, Behler Creek, Wallingford Creek and Wilson Creek (Farm Services Agency, 2003).

Floodplains

The portions of Hubbard, Cass and Crow Wing counties within the project area have not been mapped for floodplains by the Federal Emergency Management Agency. It is possible that the Proposed Route crosses the 100-year floodplains associated with the Crow Wing River, Pine River, and/or Hay Creek, as well any floodplains associated with the lakes in the vicinity.

Public Waters

Public Waters are water basins and watercourses of significant recreational or natural resource value in Minnesota as defined in Minnesota Statute 103G.005. The MDNR has regulatory jurisdiction over these waters.

The Proposed Route crosses six Public Water Inventory (PWI) lakes (five in Cass County and one in Hubbard County), three PWI wetlands (all in Hubbard County) and nine PWI creeks and rivers (seven crossings in Cass County and two in Hubbard County) (Figures 5-2 to 5-17). Table 6-5 lists the PWI resources along the Proposed Route.

Table 6-5 PWI Waters

County	Name	Type	Location
CASS	Paquet (381 P) – 2 crossings	Lake	T140N, R30W, Sections 20 and 29
	North Haynes (449 P)	Lake	T139N, R31W, Sections 5 and 6
	Unnamed (667P)	Lake	T137N, R29W, Section 19
	First Trestle (837 P)	Lake	T139N, R31W, Section 2
	Unnamed (838 P)	Lake	T139N, R31W, Sections 2 and 11
	Pine River (4 crossings)	River/stream	T139N, R30W; Section 18
			T138N, R31W; Section 14
			T138N, R30W; Section 32
			T137N, R30W; Section 12
	Unnamed Tributary between Birch Lake and Paquet Lake	River/stream	T140N, R30W; Section 19
Behler Creek	River/stream	T137N, R30W; Section 11	
Wilson Creek	River/stream	T137N, R30W; Section 3	
HUBBARD	Fifth Crow Wing (92 P)	Lake	T140N, R33W, Section 29
	Unnamed (320 W)	Wetland	T139N, R32W; Sections 23 - 25
	Tamarack (94 W)	Wetland	T140 N, R33W; Section 25
	Mud (168 W)	Wetland	T140N, R34W; Sections 20 and 21
	Crow Wing River	River/stream	T140N, R33W; Section 29
	Wallingford Creek	River/stream	T140N, R33W; Section 36

Source: MDNR, 2005. *Public Waters Inventory Maps and Lists*.

Wetlands

Wetlands are defined by the United States Army Corps of Engineers (USACE) as “Waters of the U.S.” and are subject to jurisdiction under Section 404 of the Clean Water Act (1973). Waters of the U.S. include both wetlands and non-wetlands that meet USACE criteria. In Minnesota, all wetlands are regulated under the Wetland Conservation Act (see Minnesota Statute §1036.222-.2373 requiring coordination with Minnesota Board of Water and Soil Resources (BWSR)) and by the USACE under Section 404 of the Clean Water Act.

Wetland resources for the Proposed Route were identified by reviewing United States Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) mapping. NWI wetlands are shown on Figures 5-2 to 5-17. There are 74 NWI wetlands along the Proposed Route (primarily palustrine scrub/shrub and palustrine emergent wetlands), as listed on Table 6-6.

Table 6-6 NWI Wetlands

Wetland Type	No. of Basins	% of Wetland Type in Route
Lacustrine	3	4.1%
Palustrine	-	-
Emergent	26	35.1%
Forested	6	8.1%
Scrub/shrub	32	43.2%
Unconsolidated bottom	6	8.1%
Riverine	1	1.4%
Total	74	

Source: USFWS, 2005. *National Wetlands Inventory*.

Impaired Waters

The MPCA lists several impaired waters in the project area on its 2006 Impaired Waters List. The Proposed Route crosses Crow Wing River and Mud Lake, which are both impaired for mercury and fecal coliform. Long Lake, Tamarack Lake and Birch Lake are within a mile of the Proposed Route. Long Lake and Tamarack Lake are impaired for mercury and fecal coliform, and Birch Lake is impaired for excess nutrients (MPCA, 2006).

6.6.3 Unavoidable Impacts

Groundwater

It is possible that Project construction would require dewatering. If dewatering is necessary during construction (i.e., during pole embedding), the effects on water tables would be localized and short-term. The Project will have no impact on either municipal or private water uses in the project area. No water storage, reprocessing or cooling is required for either the construction or operation of the transmission line or substations. Therefore, the Project will not result in violations of groundwater quality standards.

Surface Water

In a letter dated June 3, 2005 (Appendix C), the USACE indicated that a project may be subject to USACE jurisdiction and require a Section 10 permit if it includes construction, excavation, or deposition of materials in navigable waters of the United States. No navigable water of the United States will be affected by the Project, therefore no Section 10 permit will be required.

The USACE also indicated that a proposal may be subject to USACE jurisdiction under Section 404 of the Clean Water Act if it involves deposition of dredged or fill material into waters of the United States (navigable waters, their tributaries, and adjacent wetlands). Section 404 approvals are not expected to be required for this Project.

Some minor impacts to surface water resources could occur to wetlands or Public Waters due to construction of the Project. However, the Applicants anticipate that most wetland areas and surface water features, such as rivers and streams, will be avoided by spanning the transmission line over the water bodies. There are 11 NWI basins (two of which are also PWI basins) that are wider than the maximum span along the Proposed Route where complete avoidance may not be feasible. It is estimated that approximately 23 structures will be placed in NWI wetlands, for a temporary impact of approximately 3,400 square feet (0.08 acres) and a permanent impact of approximately 560 square feet (0.01 acres). Table 6-7 shows the PWI wetlands wider than the maximum span along the Proposed Route, the estimated number of structures that may be placed within each PWI, and the estimated temporary and permanent impacts per water body.

Table 6-7 PWI Wetlands (Wider than Maximum Span)

Name	Width (feet)	No. of Structures in PWI	Temporary Impact (sq. feet)	Permanent Impact (sq. feet)
North Haynes (449P)	1,200	1	158	26
Unnamed (320 W)	8,520	8	1,264	208

However, rebuilding in-place or paralleling the existing transmission lines that currently skirt the majority of the hydrologic features will minimize any new impacts to wetlands and water bodies.

Construction of the transmission line is not expected to alter existing water drainage patterns or floodplain elevations due to the small cross section per pole and their relatively wide spacing. Although construction of the proposed substations will involve a small increase in impermeable surfaces (from the control houses and structure footings), the change to local surface drainage patterns from this and any necessary grading is expected to be negligible. The small area of impermeable surfaces created

by the pole structures and substation outbuildings will not cause an increase in susceptibility of flooding in the region.

Construction of the Project will not cause loading of nutrients, mercury or fecal coliform into the impaired waters within the project area.

6.6.4 Potential Mitigation

Groundwater

If dewatering is necessary, dewatered groundwater will be properly stored and sediments will be settled out and removed before the water is discharged.

Surface water

The Applicants will maintain sound water and soil conservation practices during construction and operation of the Project to protect topsoil and adjacent water resources and minimize soil erosion. Best Management Practices (BMPs) may include:

- Contain stockpiled material away from stream banks and lake shorelines.
- Stockpile and respread topsoil.
- Locate structures and disturbed areas away from rivers and lakes, where practical.
- Use turbidity control methods prior to discharging wastewater from concrete batching or other construction operations to streams or other surface waters. Wastewaters discharged will be free of settleable material.

When it is not possible to span a wetland, the Applicants will draw on several options during construction to minimize impacts:

- Construction will be scheduled during frozen ground conditions whenever possible, and ice roads will be used to minimize impacts.
- Crews will attempt to access the wetland with the least amount of physical impact to the wetland (i.e., using the shortest route, or walking instead of driving).
- Structures will be assembled on upland areas before they are brought to the site for installation, when practical.
- Construction mats will be used where wetlands will be impacted when construction during winter is not possible.
- If it is determined that a WCA or Section 404 permit is necessary, the Applicants will work with the jurisdictional agencies (USACE, MDNR and/or BWSR) to

determine the best ways to minimize the impacts and create appropriate mitigation measures.

If the Pine River Substation is relocated, proposed construction activities at the site would result in the disturbance of one acre or more of soils and a National Pollutant Discharge Elimination System (NPDES) stormwater permit would be required. A Stormwater Pollution Prevention Plan (SWPPP) would be prepared that would include erosion control plans and BMPs that would be implemented. To minimize contamination of water due to accidental spilling of fuels or other hazardous substances, all construction equipment would be equipped with spill cleanup kits.

6.7 Natural Vegetation and Associated Wildlife

6.7.1 Vegetative Communities

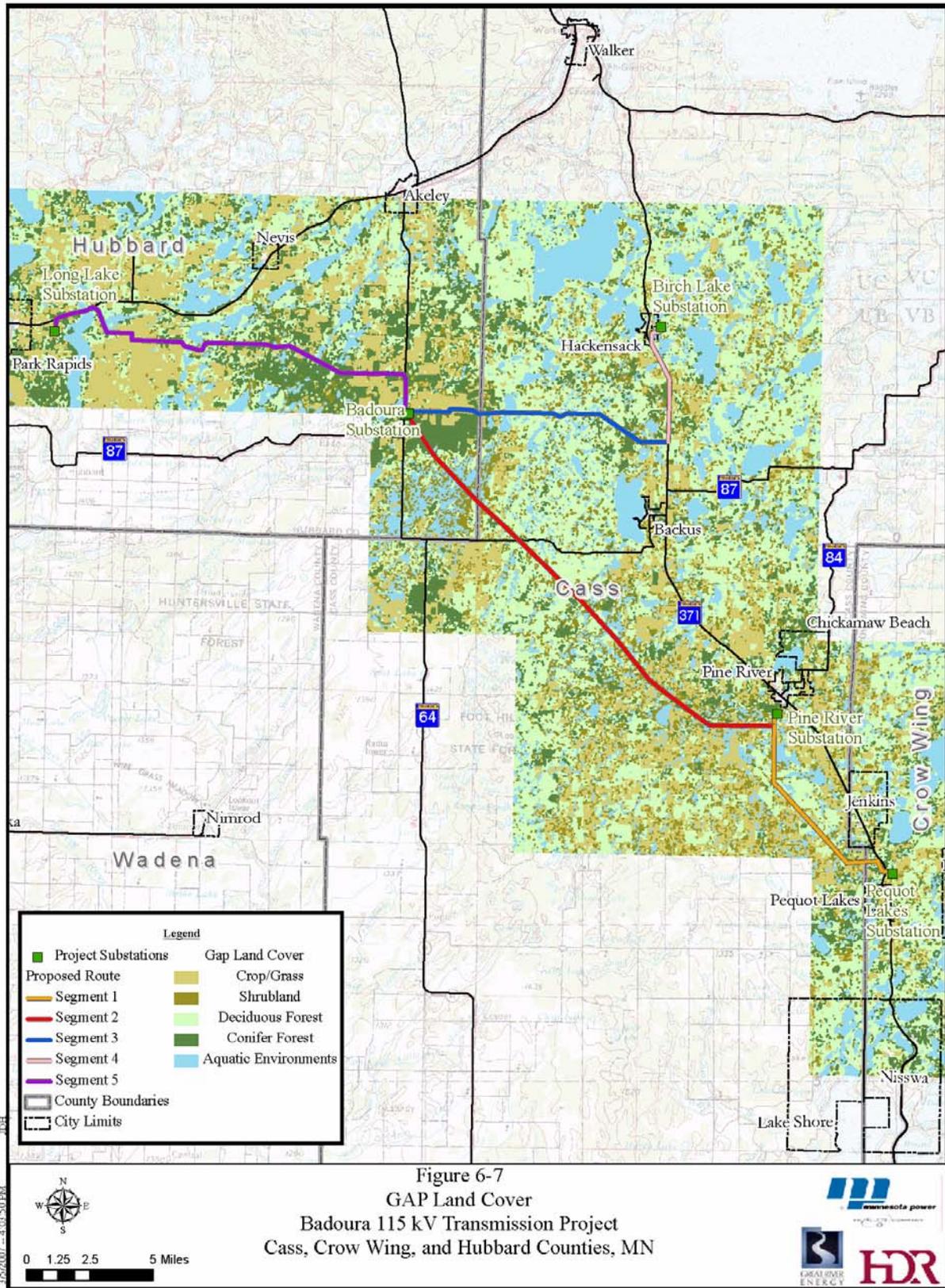
The Proposed Route is located within the Northern Lakes and Forests Ecoregion, which is dominated by mature conifer and northern hardwood forests and interspersed with lake and wetland plant communities. Minnesota GAP land cover data show that approximately 44 percent of the land along the Proposed Route is woodland (including coniferous and deciduous forests), approximately 27 percent is grassland and shrubland, and 18 percent of the land is cropland. A summary of the land cover types along the Proposed Route is shown in Table 6-8, and land cover types are shown in Figure 6-7.

Table 6-8 GAP Land Cover Types

LAND COVER TYPE	AREA (ACRES)	PERCENT OF ROUTE
Coniferous forest	1,680.1	16.4%
Deciduous forest	2,780.5	27.2%
Shrubland	1,542.2	15.1%
Grassland (including pasture)	1,219.7	11.9%
Wetlands	973.9	9.5%
Open water	133.4	1.3%
Cropland	1,873.5	18.3%
Developed	13.1	0.1%

Source: MDNR, Forestry Division, 2002. GAP-based Land Cover - Vector.

The Proposed Route crosses the Badoura State Forest in Cass and Hubbard counties and crosses the Foothills State Forest in Cass County. The Badoura State Forest contains a state nursery, where Norway pine, jack pine, white pine, white spruce, black spruce, black walnut, green ash, red oak, silver maple and wild plum are cultivated. State- and federal-listed plant species and MDNR-listed natural communities are discussed in Section 6.8.



6.7.2 Wildlife Habitat

Wildlife in the vicinity of the Proposed Route consists of birds, mammals, fish, reptiles, amphibians and insects, both resident and migratory, which use the area habitat for forage, shelter, breeding habitat and/or stopover during migration. Species likely to be found are those associated with forested and/or grassland habitats, including small mammals, such as voles, shrews, mice and rabbits; and larger mammals, such as beaver, bobcat, coyote, gray wolf, river otter, fox, white-tailed deer, black bear, waterfowl and songbirds (both forest and grassland species). Fish, reptiles and amphibians, such as snakes, turtles, toads and frogs would likely be found near the wetlands and open water along the Proposed Route (MDNR, 2005: Animap).

The Badoura and Foothills State Forests are managed for wildlife and likely provide habitat for many woodland species. There are no MDNR-managed Scientific and Natural Areas (SNA) or WMAs along the Proposed Route. The Crow Wing Chain WMA in Hubbard County, the Twin Heron WMA in Cass County, and the Lowell WMA in Crow Wing County are all within five miles of the Proposed Route (MDNR, 2004). These WMAs are managed for waterfowl, grouse and furbearers and also provide habitat for non-game species of wildlife. It is possible that wildlife found within these WMAs could also be found along the Proposed Route.

There is one colonial waterbird rookery within one mile of the Proposed Route in Hubbard County. The rookery contains great blue herons (*Ardea herodias*) (Minnesota Natural Heritage and Nongame Wildlife Program, 2006). Potential effects on this resource and state- and federal-listed wildlife species found in the vicinity of the Proposed Route are discussed in Section 6.8.

6.7.3 Unavoidable Impacts

Vegetative Communities

Permanent impacts to vegetation may occur due to the placement of structures. The area around the structure may also be temporarily disturbed due to construction activities. Because the Proposed Route parallels existing 230 kV and 34.5 kV transmission lines and roadways, construction in previously undisturbed communities will be minimized. Some vegetation clearing may be necessary; however, due to expanded right-of-way needs associated with the upgraded facility. If the Pine River Substation is relocated, it will result in less than 1.5 acres of impact.

The Applicants will span areas containing natural communities wherever possible. Approximately 32 acres of tree clearing within existing easements will be required within Badoura State Forest, and approximately 28 acres of tree clearing within existing easements will be required within the Foothills State Forest. These clearings will be necessary to construct and operate the proposed transmission line parallel to the existing line, and will not require expansion of existing easements. Overall, approximately 133 acres of trees and hedgerows will be cleared.

Wildlife Habitat

There is minimal potential for the displacement of wildlife and loss of habitat from construction of the transmission line. Wildlife that inhabit natural areas could be impacted in the short-term within the immediate area of construction. The distance that animals will be displaced will depend on the species; however, no population level effects are anticipated from the Project.

Raptors, waterfowl and other bird species may also be affected by the construction and placement of the transmission lines. Avian collisions are a possibility after the completion of the transmission line. Waterfowl are typically more susceptible to transmission line collision, especially if the transmission line is placed between agricultural fields that serve as feeding areas, or between wetlands and open water, which serve as resting areas. The majority of the Proposed Route is along existing right-of-way; therefore impacts to waterfowl will be minimized.

Additionally, electrocution of large birds, such as raptors, is a concern typically related to distribution lines. Electrocution occurs when birds with large wingspans come in contact with either two conductors or a conductor and a grounding device. The Applicants' transmission line design standards provide adequate spacing to eliminate the risk of raptor electrocution. As such, electrocution is not a concern related to the Project.

6.7.4 Potential Mitigation

Vegetative Communities

Minimal grading is expected to be necessary. Areas disturbed due to construction activities will be restored to pre-construction contours.

The Applicants will work with the MDNR to minimize and avoid impacts to sensitive flora within the Badoura and Foothills State Forests. Areas disturbed in state forest land will be reseeded with a seed mix recommended by local MDNR management staff.

Wildlife Habitat

The Applicants will address avian issues by working with the MDNR to identify any areas that may require marking transmission line shield wires and/or to use alternate structures to reduce the likelihood of collisions.

6.8 Rare and Unique Natural Resources

6.8.1 Threatened and Endangered Species and Natural Communities

Table 6-9 lists the rare or unique resources identified within one mile of the Proposed Route. These resources were identified using the MDNR Natural Heritage Database. The Proposed Route is within one mile of three recorded occurrences of bald eagles, a federally-threatened, state special status species; four recorded occurrences of

Table 6-9 Rare and Unique Resources

Common Name	Number of Occurrences	Scientific Name	Federal Status	MN Status*	State Rank**	Habitat
Bald Eagle	3	<i>Haliaeetus leucocephalus</i>	Threatened	SPC	S3B,S3N	Forested areas near lakes and rivers
Blanding's Turtle	4	<i>Emydoidea blandingii</i>	Not Listed	THR	S2	Wetlands and adjacent grasslands
Yellow Rail	1	<i>Coturnicops noveboracensis</i>	Not Listed	SPC	S3B	Marshes and wet meadows
Least Darter	2	<i>Etheostoma microperca</i>	Not Listed	SPC	S3	Shallow, weedy stream water in spawning and growing season; deep stream pools in winter
Greater Prairie-chicken	9	<i>Tympanuchus cupido</i>	Not Listed	SPC	S3	Mesic prairies
Northern Goshawk	1	<i>Accipiter gentilis</i>	Not Listed	NON	SNRB,SNRN	Coniferous forests
Eastern Hognose Snake	1	<i>Heterodon platirhinos</i>	Not Listed	NON	S4	Dry prairies
Colonial Waterbird Nesting Site	1		Not Listed	None	SNR	
Jack Pine - (Yarrow) Woodland, Ericaceous Shrub Subtype	1		Not Listed	None	S2	Dominated by Jack pine (<i>Pinus banksiana</i>) with occasional red pine (<i>Pinus resinosa</i>) and paper birch (<i>Betula papyrifera</i>). Northern red oak (<i>Quercus rubra</i>) common in tall-shrub layer. Cow wheat (<i>Melampyrum lineare</i>), starflower (<i>Trientalis borealis</i>), tessellated rattlesnake plantain (<i>Goodyera tessellata</i>), and large-leaved aster (<i>Aster macrophyllus</i>) in herb layer.

* THR – Threatened; SPC – Special Concern; NON – no legal status, data being gathered for possible future listing; None – Terrestrial communities and colonial waterbird sites do not have assigned status, but are considered important ecologically.

** State rank is assigned to species and terrestrial communities to reflect the extent and condition of that element. Ranks range from S1 – in greatest need of conservation, to S5 – secure under present conditions. SNR – not ranked; B (qualifier) – status applies to breeding population; N (qualifier) – status applies to non-breeding population

Source: Minnesota Natural Heritage and nongame Wildlife Program. 2006. Threatened Natural Communities and Rare Species List

Blanding's turtles, a state threatened species; and nine occurrences of greater prairie chickens, two occurrences of least darter minnows and one occurrence of a yellow rail, all state special status species. Additionally, two occurrences of non-ranked species for which the MDNR is currently gathering more data are within a mile of the Proposed Route. A great blue heron rookery is located within a mile of the Proposed Route, as is a Jack pine – (Yarrow) Woodland natural community.

6.8.2 Unavoidable Impacts

No impacts to special status species are expected as a result of this Project. The vast majority of the Project is along or parallel to existing transmission line and/or roadway right-of-way; therefore, impacts to previously undisturbed habitat (where the majority of rare species occur) will be avoided.

The minimal loss of Bald eagle habitat that could occur will not affect population levels. As stated above, the Applicants will use design standards that provide adequate spacing to eliminate the risk of raptor electrocution.

Impacts to wetlands (Blanding's turtle and yellow rail habitat) are expected to be minimal and will not affect the species. Although there will be several structures placed in wetlands, they will be either adjacent to or a rebuild of existing structures and therefore will not impact undisturbed wetlands. The transmission line will not impede the turtles' movement between breeding and foraging habitat.

Although the Proposed Route will go relatively near prairie chicken nesting areas, it follows existing transmission line right-of-way and therefore should not increase opportunities for predation over existing levels.

The transmission lines will span all streams; therefore no impacts to the least darter will occur. The minimal amount of coniferous forests and dry grasslands that may be affected by the Project will not result in population-level effects to the Northern goshawk or Eastern hognose snake, respectively.

The proposed alignment is approximately 800 feet from a great blue heron colony, which is known to be active as of 2006. Because of the high density of birds in such rookeries, any disturbance to the site has the potential to impact the reproductive success of large portions of a species' regional population. The transmission line will be built along existing transmission right-of-way and will not directly impact the colony. A conversation with the MDNR Non-Game Wildlife Specialist for the Northwest Region confirmed that because construction will remain within the existing easements and tree clearing will occur on the far side of the existing transmission line away from the colony, no impacts are expected (Haws, 2007).

The Proposed Route does not cross and will not impact the MDNR-listed Jack pine natural community.

6.8.3 Potential Mitigation

The Applicants will maintain sound water and soil conservation practices during construction and operation of the Project to protect topsoil and adjacent water resources and minimize soil erosion and sedimentation. Spans will be maximized through wetlands, minimizing the number of poles placed in the wetlands. These measures will avoid and minimize disturbance to terrestrial and aquatic habitats for special status species.

If construction of the transmission line requires access outside of the existing right-of-way, access will avoid the vicinity of the great blue heron colony.

6.9 Physiographic Features

6.9.1 Topography

The Proposed Route is located within the Northern Minnesota Drift and Lake Plains section of the Ecological Classification System (MDNR, 2007). The area is generally flat to gently rolling. Kettle lakes and lakes greater than 160 acres are common throughout. Elevations generally range between 1,250 and 1,500 feet across the project area. The lowest elevation is 1,232 feet near Pine River, and the highest elevation is 1,565 feet between the Badoura Substation and TH 371 (United States Geological Survey (USGS), 2005).

6.9.2 Geology

The Proposed Route lies within the Pine Moraines and Outwash Plains subsection of the Northern Minnesota Drift and Lake Plains section. This subsection is characterized by end moraines, outwash plains, till plains and drumlin fields. Sands and sandy loam soils overlay Quaternary drift materials that are approximately 200 to 600 feet thick. Precambrian bedrock is generally granite, gneiss and slate (USGS, 1968 and 1972).

6.9.3 Soils

The soils found along the Proposed Route are generally moderately well-drained to excessively well-drained sandy loams or loamy sands, with poorly-drained muck soils found in the large wetland depressions. USDA Natural Resource Conservation Service (NRCS) Soil Survey data were reviewed to describe the soil resources along the Proposed Route. Soils are generally grouped into categories known as associations. A soil association has a distinctive pattern of soils, relief and drainage, and is a unique natural landscape. Typically, an association consists of one or more major soils and some minor soils. The soils in the project area are within four soil associations, as shown in Table 6-10.

Table 6-10 Soil Associations in the Project Area

Soil Association	Percent of Corridor	General Description
Brainerd-Wabedo-Nokay	15%	Poorly drained to moderately well drained, deep to moderately deep soils formed in loamy glacial till on drumlins and ground moraines
Chetek-Bergkeller-Menahga	40%	Excessively drained to moderately well drained, very deep soils formed in loamy alluvium and/or till and the underlying sandy and gravelly outwash in outwash plains, moraines and drumlins
Cushing-Demontreville-Mahtomedi	14%	Excessively drained to moderately well drained, very deep soils formed in loamy calcareous till or aeolian or glacial lacustrine sediments, or sandy outwash on ground moraines and outwash plains
Dorset-Verndale-Fauce	31%	Somewhat excessively drained to well drained, very deep soils formed in a loamy mantle and the underlying sandy and gravelly outwash in outwash plains, moraines and stream terraces

Source: U.S. Department of Agriculture, NRCS. 1994. *State Soil Geographic (STATSGO) Data Base for Minnesota*.

6.9.4 Prime Farmland and Additional Lands of Statewide Importance

Prime farmland is defined by the NRCS as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. The NRCS has three levels for prime farmland, and each county NRCS department is responsible for assigning prime farmland designations to each of the soil series found in its county. The most important class is prime farmland, which produces high yields of crops. Prime farmland when drained includes soils that have the potential to be prime farmland but require drainage or hydrologic alteration to achieve high productivity. Farmland of statewide importance include soils that are nearly prime but are not as productive due to permeability, slope, erosion potential, or some other soil property.

Cass County

No digital soil data are available for Cass County. The Cass County Soil Survey indicates that approximately three percent of the soils crossed by the Proposed Route are prime farmland, approximately one percent is prime farmland when drained, and approximately 15 percent is farmland of statewide importance (USDA, 1997).

Crow Wing County

No digital soil data are available for Crow Wing County. Updated Reconnaissance Maps provided by the Crow Wing County NRCS indicate that approximately 95 percent of the Proposed Route crosses farmland of statewide importance in Crow Wing County

(USDA, 2006). No prime farmland (or prime farmland when drained) is crossed by the Proposed Route in this county (USDA, 2005).

Hubbard County

Digital soil data are available for Hubbard County. Approximately 69.1 percent of the route is on farmland of statewide importance in Hubbard County. No prime farmland (or prime farmland when drained) is crossed by the Proposed Route in this county (USDA, 2003 and 2005).

6.9.5 Unavoidable Impacts

Topography

Disturbed areas will be regraded to existing conditions. No impacts to regional topography will result from the Project.

Geology

The Project will not impact the geology of the project area.

Soils

Soil disturbance will result from site clearing and excavation activities at structure locations, pulling and tensioning sites, substations, setup areas and during transport of crews, machinery, materials and equipment over access routes (primarily along transmission right-of-way). Construction of the transmission line is expected to result in approximately 552 acres of temporary impact and 11,700 square feet (0.27 acres) of permanent impact to soils. If the Pine River Substation is relocated, construction will result in less than 1.5 acres of permanent impact to soils.

Prime Farmland and Additional Lands of Statewide Importance

In Cass County, approximately 200 square feet of prime farmland, approximately 65 square feet of prime farmland when drained, and approximately 980 square feet of farmland of statewide importance will be permanently impacted by the Project. Additionally, if the Pine River Substation is relocated, approximately 9,800 square feet (0.23 acres) of farmland of statewide importance could be impacted. In Crow Wing County, approximately 195 square feet of farmland of statewide importance will be permanently impacted. In Hubbard County, approximately 3,510 square feet of farmland of statewide importance will be permanently impacted by the Project.

The removal of this small amount of prime farmland will not affect the productivity of the three counties.

A letter from the NRCS dated August 7, 2006 (Hubbard County) indicated that the proposed construction plans and methods would have little or no effect on prime and statewide important farmlands within or along the Proposed Route in Hubbard County. A letter from the NRCS also dated August 7, 2006 (Crow Wing and Cass counties) indicated that one and two-pole transmission lines are exempt from the Farmland Protection Policy Act.

6.9.6 Potential Mitigation

Topography

Because no impacts will occur, no mitigation is necessary or proposed.

Geology

Because no impacts will occur, no mitigation is necessary or proposed.

Soils

To the extent practical, excavation activities in steep slope areas will be avoided. Where excavation cannot be avoided entirely, it will be minimized and BMPs (such as silt fencing, straw bales, ditch blocks, covering bare soils with mulch, plastic sheeting or fiber rolls to protect drainageways and streams from sediment runoff from exposed soils) will be implemented during construction, especially during significant precipitation events. Revegetation will occur after construction is completed.

Prime Farmland and Additional Lands of Statewide Importance

The measures listed above for mitigating impacts to soil, as well as those listed in Section 6.3.5 (Agriculture) will be used to mitigate impacts to prime farmland and farmland of statewide importance.

6.10 Land Use

The project area includes a variety of land use patterns in a general rural environment.

6.10.1 Land Use and Zoning

Crow Wing County

The 1996 Crow Wing County Current Land Use Map shows that the Proposed Route crosses areas of forest, grassland, rural residential uses, bare rock and wetlands (Crow Wing County, 1996). The 2006 Pequot Lakes Zoning Map shows that the Proposed Route crosses areas zoned for agriculture and forest management (City of Pequot Lakes, 2006).

Cass County

The Proposed Route crosses central Cass County in Loon Lake, Wilson, Walden, Pine River, Bull Moose, Deerfield, Powers and Birch Lake townships. According to the Cass County Land Use Map, the Proposed Route crosses forest, wetland, grassland and rural residential land uses (Cass County, 2005).

The Proposed Route also crosses the town of Hackensack and passes near the town of Pine River. In Hackensack, it crosses areas of commercial (primarily along TH 371) and residential land uses. According to the 1994 Pine River Zoning Map, the Proposed Route lies outside of the incorporated boundaries. Land use at the Pine River Substation area is generally rural residential (City of Pine River, 1994). The Pine River Municipal Airport is within a mile and a half of the Proposed Route in Section 32 of

Barclay Township. The Proposed Route passes through areas within Airspace Obstruction Zoning (Sections 1 and 12 of Walden Township and Section 6 of Barclay Township) and Land Use Safety Zoning (Section 6 of Barclay Township), as described in the Pine River Airport zoning ordinance (City of Pine River, 1980).

Hubbard County

The Project is located in southeastern Hubbard County. Hubbard County does not maintain an official land use map. Field visits and aerial mapping show that the portion of the corridor within Hubbard County crosses primarily irrigated agricultural land with a mix of residential properties, cottages and woodlots.

The western end of the project area is approximately two miles east of the City of Park Rapids. A cursory field review showed new residences near this end of the corridor outside of the incorporated City of Park Rapids. The Project is outside of the safety zoning associated with the Park Rapids Municipal Airport, which is approximately two miles southwest of the western Project terminus.

6.10.2 Public Lands and Recreational Areas

Park and Recreational Areas and Municipal Trails

The Proposed Route crosses the Badoura and Foothills State Forests along existing transmission right-of-way. The Proposed Route also crosses seven snowmobile trails: one between the Pequot Lakes Substation and the Pine River Substation, two between the Pine River Substation and the Badoura Substation, three between the Badoura Substation and the Birch Lake Substation, and one between the Badoura Substation and the Long Lake Substation. The Proposed Route crosses the Paul Bunyan State Trail and the Heartland Trail. The Proposed Route does not cross any WMAs, SNAs, or county parks.

6.10.3 Unavoidable Impacts

Impacts to land use as a result of the Project are expected to be minimal. Because the Proposed Route follows existing transmission lines and roadways, construction within transmission and adjacent to roadway right-of-way will minimize placement of structures in other land uses. Some placement of structures outside of existing right-of-way may be necessary due to expanded right-of-way needs associated with the upgraded facility. Construction of the facility will not change the possible land uses for any area.

The Project will not affect the uses of public lands and recreational areas because it will be built along existing transmission right-of-way through the state forests and at the snowmobile trail crossings. The transmission line will not affect the use of the Paul Bunyan or Heartland Trails.

6.10.4 Potential Mitigation

In a letter dated August 25, 2006 (Appendix C), the MNDOT Office of Aeronautics indicated that it may not be necessary to submit a FAA Form 7460-1 (Notice of Proposed Construction or Alteration) for the Project. However, when line design is complete, the Applicants will review the current airport zoning documents or ordinances to ensure that structures comply with airport safety zones and ordinances.

The Applicants will coordinate with the MDNR to determine avoidance and minimization methods for the state land crossings.